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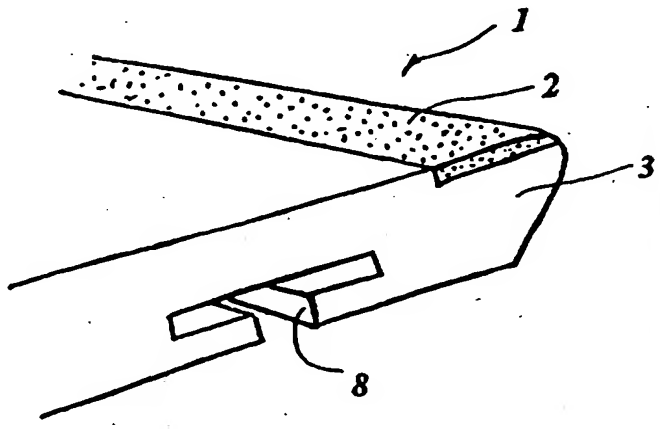
(54) Title: FOIL BLADE

(57) Abstract

The present invention concerns a foil blade (1) and its method of manufacture. The blade comprises a substrate (3) and a wear-resistant layer (2), the wear-resistant layer being applied as an adhesive, the adhesive comprising wear-resistant particles suspended in an unset settable material.



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FOIL BLADE

The present invention relates to a blade for use in apparatus such as that used for forming and processing material in sheet form, and particularly to a wear-resistant foil blade suitable for conveying a moving paper web during the manufacture of paper.

Blade arrangements in existence incorporate the use of coatings that are thermally sprayed onto metal blades. Such blades can subsequently be bonded or held in close contact with a plastic sub-structure.

Thermal spraying techniques have a disadvantage in that they are expensive, requiring costly spraying equipment and associated safety equipment and also involve a high energy consumption. Furthermore, thermal spraying techniques present difficulties in depositing a wear-resistant layer directly onto a plastics sub-structure in view of the high temperatures that can damage the sub-structure. This is disadvantageous in view of the cost and weight advantages that plastics can afford over metal.

It is therefore an object of the present invention to provide a blade and a method of manufacture thereof which overcomes the disadvantages of the prior art.

According to an aspect of the present invention there is provided a method of manufacture of a blade comprising a substrate and a wear-resistant layer, the method including the step of:-

applying the wear-resistant layer in the form of an adhesive, the adhesive comprising wear-resistant particles suspended in an unset settable material.

Preferably, the adhesive is sprayed onto the blade substrate. Spraying is advantageous in that it provides an even

distribution of material onto the blade substrate. Alternatively however, the adhesive may be applied mechanically to the blade substrate, for example by extrusion techniques.

Conveniently, the method comprises the further step of adding further blade surface materials whilst the adhesive is unset. Such further materials may be applied by thermal spraying or by mechanical means.

The method may comprise the step of applying pre-formed wear-resistant tiles onto the blade substrate and applying the adhesive between edges of adjacent tiles.

The present invention further encompasses a blade manufactured according to the materials defined above.

In preferred embodiments, the adhesive comprises a polymer material in which is suspended any of silicon carbide, tungsten, alumina, zirconia or chrome oxide particles.

Preferably the blade substrate is recessed in an area where the adhesive is to be applied. Such recessing facilitates the application of the adhesive layer.

Conveniently, the substrate comprises a removable member onto which the wear-resistant layer is formed. The removable member may be hollow.

In preferred embodiments, the wear-resistant particles form 50-70% by weight of the wear-resistant layer.

According to a further aspect of the present invention, there is provided a foil blade for use in processing sheet material comprising a polymer material in which is suspended wear-resistant particles.

Certain preferred embodiments of the invention will now be described with reference to the accompanying drawings; of which:-

Figure 1 shows a blade in accordance with a first embodiment of the present invention;

Figure 2 shows a blade in accordance with a second embodiment of the present invention;

Figure 3 show a cross-sectional view of the blade shown in Figures 1 or 2; and

Figure 4 shows an alternative blade.

As shown in Figure 1, a blade 1 for use with paper mill equipment includes a substrate 3, preferably formed of plastics or a glass fibre composite material, and an adhesive mixture wear-resistant layer 2.

The wear-resistant layer may be formed using any suitable materials, although one or more of silicon carbide, tungsten, alumina, zirconia or chrome oxide are preferred for use as wear-resistant particles. Such particles are preferably provided within an epoxy material, e.g. a thermo setting or thermo plastics material. The particles are generally in the range of 50-70% by weight of the wear-resistant layer. With silicon carbide particles for example, the particles are preferably around 55% by weight of the wear-resistant layer.

The wear-resistant layer 2 may be applied to the substrate 3 using spraying techniques or may be applied mechanically, for example by extrusion techniques.

Additional blade surface materials may be applied to the adhesive layer whilst it is still sticky, i.e. whilst it has

not dried. Such additional materials may be applied mechanically (cold) or by thermal spraying.

As shown in Figure 2, the wear-resistant layer may be formed by applying a layer of pre-made tiles 4 onto an adhesive layer 5 and filling the gaps 6 between the tiles with the epoxy adhesive composite mixture. Blades of over 10 metres can be produced in this way.

The pre-made tiles can be formed in any suitable manner, using for example casting or extrusion techniques. The tiles may be relatively short so that a number are required along the length of the blade, or relatively long so as to extend along the whole length of the blade.

The adhesive wear-resistant layer 2 may be applied to one or more of the faces of the blade substrate to provide a suitable wear-resistant layer. As shown in Figure 3, the substrate 3 may be recessed to assist in the application of the adhesive material. The recess will also result in a secure mounting of the wear-resistant layer. The substrate may include a removable member 7 onto which the wear-resistant layer is formed. For enhanced weight characteristics, the removable member 7 may be formed hollow, as shown by phantom-lines 9, as an extrusion. The removable member 7 can facilitate reconditioning of the foil blade on wearing down of the layer 2. The removable member can be dovetailed with the main substrate 3 for strength.

The substrate 3 may itself include a channel 8 for easy mounting thereof on a sub-structure.

Figure 4 shows an alternative blade structure where the blade is an integral member with no separate substrate. The blade comprises a polymer base material, such as a plastics material, in which is suspended wear-resistant particles of the sort described above. The blade may be cast or extruded.

It will be understood that the embodiments illustrated show an application of the invention in one form only for the purposes of illustration. In practice, the invention may be applied to many different configurations, the detailed embodiments being straightforward for those skilled in the art to implement.

CLAIMS

1. A method of manufacture of a blade comprising a substrate and a wear-resistant layer, the method including the step of:- applying the wear-resistant layer in the form of an adhesive, the adhesive comprising wear-resistant particles suspended in an unset settable material.

2. A method as claimed in claim 1, wherein the adhesive is sprayed onto the blade substrate.

3. A method as claimed in claim 1, wherein the adhesive is extruded onto the blade substrate.

4. A method as claimed in any preceding claim, wherein additional blade surface materials are applied whilst the adhesive is unset.

5. A method as claimed in any preceding claim, further comprising the step of applying pre-formed wear-resistant tiles onto the blade substrate and applying the adhesive between edges of adjacent tiles.

6. A blade manufactured according to the method of any preceding claim.

7. A blade as claimed in claim 6, wherein the adhesive comprises a polymer in which is suspended any of silicon carbide, tungsten, alumina, zirconia or chrome oxide particles.

8. A blade as claimed in claim 6 or 7, wherein the blade substrate is recessed to accept the adhesive.

9. A blade as claimed in any one of claims 6 to 8, wherein the substrate comprises a removable member onto which the wear-resistant layer is formed.

10. A blade as claimed in any one of claims 6 to 9, wherein the wear-resistant particles are 50-70% by weight of the wear-resistant layer.

11. A foil blade for use in processing material in sheet form comprising a polymer material in which is suspended wear-resistant particles.

12. A blade substantially as hereinbefore described with reference to Figures 1 to 3 or 4 of the accompanying drawings.

13. A method substantially as hereinbefore described with reference to Figures 1 to 3 or 4 of the accompanying drawings.

Figure 1

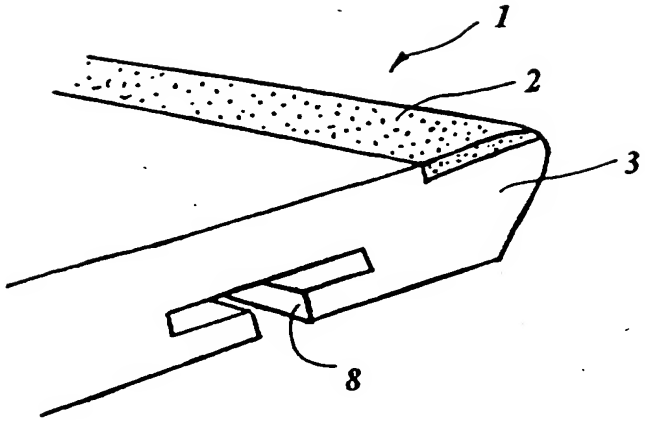


Figure 2

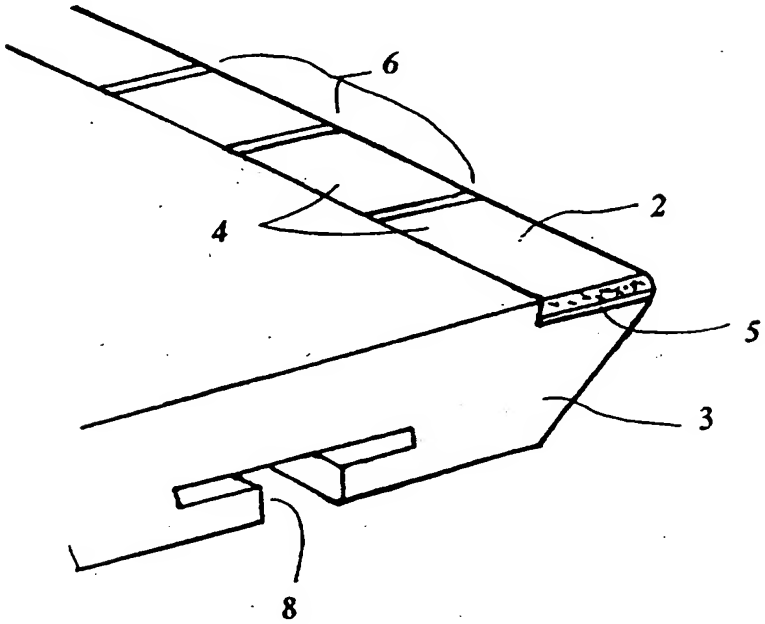


Figure 3

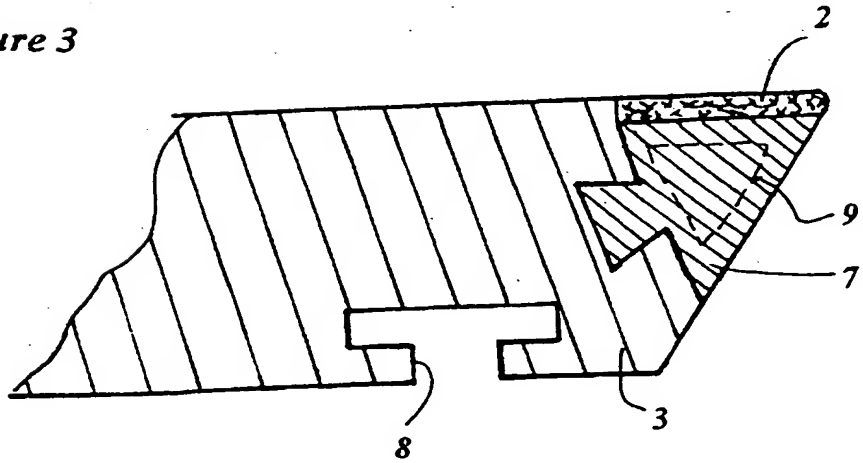
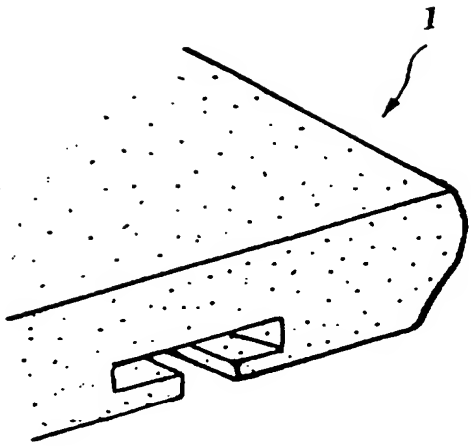


Figure 4



INTERNATIONAL SEARCH REPORT

Intr ional Application No
PCT/GB 97/00425

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 D21F1/48 D21F1/38

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 6 D21F B29C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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Y	US 5 387 172 A (HABENICHT HINRICH ET AL) 7 February 1995 see column 2, line 25 - column 2, line 45; figure 1	2

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[X] Further documents are listed in the continuation of box C.

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Date of the actual completion of the international search	Date of mailing of the international search report
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